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(54) Apparatus for controlling the composition of a laser gas or gas mixture.

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Description

This invention relates to an apparatus for controlling the composition of a laser gas or gas mixture, and is concerned particularly, but not exclusively, with such an apparatus for use with an excimer laser.

To ensure optimal output from an excimer gas laser it is necessary to maintain a fixed laser gas or gas mixture composition. Variation of the laser gas or gas mixture composition can occur due to impurities set up either by the laser operation or by pick-up from components used in the laser, such as plastics. It has been proposed to use a cryogenic trap to remove some impurities by liquifaction, but this technique has the drawback that it does not allow the removal of all possible impurities.

An excimer laser gas mixture typically comprises one or more rare gases such as Helium, Neon, Xenon and Krypton and a halogen containing molecule such as Fluorine or Hydrogen Chloride. A further technique has been proposed for impurity removal by subjecting the laser gas or gas mixture to a high temperature reaction to remove impurities and the halogen. Whilst both the foregoing proposed techniques are successful to some extent in removing impurities from a laser gas or gas mixture, they are not suitable individually for maintaining a control of the composition of a laser gas or gas mixture to within specified limits. US-A-4674099 discloses an apparatus for controlling the composition of a laser gas mixture, which includes a gas laser, and in parallel therewith a high temperature gas purifier and a cryogenic gas processor.

There is thus a need for a generally improved apparatus for controlling the composition of a laser gas or gas mixture.

According to the present invention, there is provided apparatus for controlling the composition of a laser gas or gas mixture, including a cryogenic gas-processor connectible to and substantially in parallel with a gas laser selectively to receive gas or a gas mixture therefrom, remove impurities from the gas or gas mixture and selectively return the purified gas or gas mixture to the gas laser, and a high temperature gas-purifier in gas flow connection with the cryogenic gas-processor, substantially in parallel therewith, and connectible to and substantially in parallel with the gas laser selectively to receive gas or a gas mixture therefrom, remove halogen and/or impurities from the gas or gas mixture and selectively return the dehalogenated or purified gas or gas mixture to the gas laser, characterised by including gas analysis means connectible to receive gas or gas mixture from the gas laser and operative to analyse the gas or gas mixture and produce output signals indicative of the actual composition of the laser gas or gas mixture, a source of clean laser gas or gas mixture connectible selectively to feed clean gas or selected clean gas mixture components to the gas laser, control means operative to receive said output signals from the gas analysis means indicative of the actual composition of the laser gas or gas mixture, compare the actual composition values with desired composition values, and operate the cryogenic gas-processor and/or high temperature gas-purifier and/or clean gas or gas mixture source to control the laser gas or gas mixture composition, a gas compressor in valved gas flow connection with the output side of the cryogenic gas-processor and high temperature gas purifier and gas storage means in valved connection with the output side of the gas-processor and the high temperature gas purifier and in gas flow connection with the gas compressor, with the gas compressor and the gas storage means being operable, via the control means to receive and store gas or gas mixture form the gas laser to facilitate maintenance and/or repair being carried out on the gas laser or to receive gases separated from the laser gas mixture by the cryogenic gas processor.

Preferably the control means includes a computer.

Advantageously the apparatus is connectible to an excimer gas laser.

Conveniently the apparatus is connectible to an excimer gas laser containing a gas or gas mixture including one or more rare gases such as Helium, Neon, Xenon, Krypton or Argon and a halogen containing molecule such as one or more of Fluorine or Hydrogen Chloride.

Preferably the apparatus is connectible to an excimer gas laser containing as impurities, in the gas or gas mixture, one or more of CO_2, Cl_2, CO, CCl_4, CF_4, SiF_4, HF, NO, NO_2, N_2O_4, H_2O, NH_3, N_2, O_2, H_2, CF_2O, OF_2, CH_3CL, CH_4 and CH_3F.

Advantageously said cryogenic gas-processor is operable to remove, via liquifaction, one or more of said impurities.

Conveniently the apparatus includes first and second openable and closable gas flow valves respectively on input and output sides of the cryogenic gas-processor operable selectively to control gas flow between the gas laser and the cryogenic gas-processor.

Preferably the high temperature gas-purifier includes a high temperature getter operable to remove, via hot metallic means, halogen and/or impurities from the gas or gas mixture.

Advantageously the apparatus includes third and fourth openable and closable gas flow valves respectively on input and output sides of the high temperature gas-purifier operable selectively to control gas flow between the gas laser and the high temperature gas-purifier.

Preferably the source of clean laser gas or of clean individual components of a laser gas mixture includes individual containers for the or each gas or components, means for selectively communicating

said containers with a gas flow line connectible to the gas laser and a fifth openable and closable gas flow valve in said line intermediate the containers and an end of the line connectible to the gas laser.

For a better understanding of the present invention, and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawing in which :-

Figure 1 is a diagrammatic view of an apparatus according to an embodiment of the invention for controlling the composition of a laser gas or gas mixture.

Apparatus for controlling the composition of a laser gas or gas mixture, preferably of an excimer laser gas or gas mixture, according to an embodiment of the invention is shown in Figure 1 of the accompanying drawings. In this embodiment the apparatus is used for controlling the composition of the laser gas or gas mixture of a laser such as an excimer laser 1. It is to be understood, however, that the apparatus may also be used for controlling the composition of a laser gas or gas mixture of other forms of gas lasers. The apparatus basically includes a cryogenic gas-processor 2 connected to the gas laser 1 substantially in parallel therewith, a high temperature gas-purifier 3 in gas flow connection with the cryogenic gas-processor 2, substantially in parallel therewith, and connectible to and substantially in parallel with the laser 1, gas analysis means 4, a source 5 of clean laser gas or clean individual components of a laser gas mixture and control means 6.

The cryogenic gas-processor 2 is in gas flow connection with the laser 1 via a first line 7 which acts as an output from the processor 2 and an input to the laser 1 and a second line 8 which acts as an output from the laser 1 and an input to the processor 2. By means of the lines 7 and 8 the processor 2 is operable selectively to receive gas or a gas mixture from the laser 1, remove impurities from the gas or gas mixture and selectively return the purified gas or gas mixture to the laser 1.

In the case where the laser 1 is an excimer gas laser the laser gas or gas mixture includes one or more rare gases such as Helium, Neon, Xenon, Krypton and Argon and a halogen containing molecule such as one or more of Fluorine or Hydrogen Chloride. Advantageously a suitable excimer laser gas mixture would contain about 99% of one or more of Helium and Neon, about 0.9% of one or more of Xenon, Krypton and Argon and about 0.1% of Fluorine and/or Hydrogen Chloride. Thus in such a laser gas mixture the halogen containing molecule will combine with the Xenon, Krypton or Argon to form Xenon, Krypton or Argon Fluoride or Chloride (i.e. XeF, Xe, Cl, KrF, KrCl, ArCl, ArF).

The processor 2 makes use of the fact that different gases liquify at different temperatures to provide a cryogenic trap whereby the impurities may be removed from the laser gas mixture. Typical impurities are one or more of CO_2, Cl_2, CO, CCl_4, CF_4, SiF_4, HF, NO, NO_2, N_2O_4, H_2O, NH_3, N_2, O_2, H_2, CF_2O, OF_2, CH_3CL, CH_4 and CH_3F, which may be present as a result of pick-up from components of the laser 1 or of the apparatus in general which may be made of plastics material. The gas or gas mixture is fed selectively to or from the processor 2 and to or from the laser 1 via the lines 7 and 8 by means of a first openable and closable gas flow valve 9 in the line 8 on the input side of the processor 2 and a second openable and closable gas flow valve 10 located in the first gas flow line 7 on the output side of the processor 2.

The high temperature gas-purifier 3 is also in gas flow connection with the processor 2 by means of a third gas flow line 11 and a fourth gas flow line 12. The purifier 3 is connected to the processor 2 and laser 1, substantially in parallel therewith, by means of the line 11 which forms an input to the purifier 3, an output from the processor 2 and an output from the laser 1 via the line 8 to which it is connected. The line 12 connects the laser 1, processor 2 and purifier 3 by connecting the output sides of the purifier 3 and the processor 2 to the input side of the laser 1 via the gas line 7. The purifier 3 is operable selectively to receive gas or a gas mixture from the laser 1, remove halogen and/or impurities from the gas or mixture and selectively return the dehalogenated or purified gas or gas mixture to the laser 1.

To this end to enable the selective operation a third openable and closable gas flow valve 13 is located on the input side of the purifier 3 in the line 11 and a fourth openable and closable gas flow valve 14 is located on the output side of the purifier 3 in the line 12. The valves 13 and 14 are operable selectively to control gas flow between the laser 1 and the high temperature gas purifier 3 so that 13 controls the flow of gas from the laser 1 into the purifier 3 and 14 controls the flow of purified gas from the purifier 3 back into the laser 1.

The gas purifier 3 includes a high temperature getter operable to remove, via hot metallic means, halogen and/or impurities from the gas or gas mixture. The hot metallic means may be hot metal which reacts with halogens and/or impurities to produce salts of a low vapour pressure. The more volatile of these salts may be removed by a cool or cold trap. In this way it is possible to remove halogen from the gas or gas mixture if the halogen content is too high.

The gas analysis means 4 is connected to the laser 1 via a fifth gas flow line 15 which is in gas flow connection with the line 8 to act as an input to the analysis means 4 from the laser 1. The gas analysis means 4 is operative to analyse the gas or gas mixture received from the laser 1 and produce output signals 16 indicative of the actual composition of the laser gas or gas mixture. These signals 16 are passed to the control means 6 on request from the control means 6.

The source 5 of clean laser gas or of clean individual components of a laser gas mixture is connected selectively to feed clean gas or selected clean gas mixture components to the gas laser 1 via a sixth gas flow line 17 which is connected to the line 12 on the output side of the valve 14 via a fifth openable and closable gas flow valve 18. The source 5 can include individual containers, not shown, for the or each gas or components all of which are connectable selectively with the gas flow line 17 on demand. In this way the composition of the gas or gas mixture supplied to the laser 1 can be controllably varied.

To ensure that the composition is controlled correctly as required the control means 6 includes a computer (not shown) and is operative to receive the output signals 16 from the gas analysis means 4 which are indicative of the actual composition of the laser gas or gas mixture in the laser 1, compare the actual composition values with desired composition values held in the control means 6 and operate the cryogenic gas-processor 2 and/or high temperature gas-purifier 3 via respective control lines 19 and 20. Additionally the control means 6 is operable to control the operation of the source 5 and valve 18 by control signals 21. In this way the control means 6 compares the actual gas or gas mixture composition values received from the gas analysis means 4 with the desired values and if the halogen content is too high the gas or gas mixture in the laser 1 is passed through the high temperature gas-purifier 3. If the halogen content is too low the halogen content is replenished via the source 5 under the control of the control means 6. If certain impurities are too high then the control means 6 makes appropriate choice of the processor 2 and purifier 3 and passes the gas or gas mixture from the laser 1 thereto, after reference to a stored data base on vapour pressures. Thus the apparatus of the embodiment of Figure 1 allows complete control to be exercised over the composition of the gas or gas mixture in the laser 1.

The apparatus of Figure 1 also includes a gas compressor 22 in gas flow connection via a valve 23 with the gas line 12 on the output side of the valves 10 and 14 from the processor 2 and purifier 3 respectively. The gas compressor can thus be operated via selective operation of the valves 10, 14 and 23 under the control of the control means 6 to receive gas either from the processor 2, purifier 3 or both. Operation of the compressor 22 is controlled by the control means 6 via a control line 24. Gas storage means 25 are also provided in connection with the line 7 on the output side of the processor 2 and purifier 3 via a further selectively operable openable and closable valve 26. The compressor 22 and gas storage means 25 are in gas flow connection via a gas flow line 27 in which is a selectively openable and closable valve 27a. The valve 27a is operable so that the gas storage means 25 can be sealed off from the compressor 22. The gas storage means 25 is operable via the valves 26 and 27a under the control of the control means 6 via a control line 28. The control line 28 may provide a pressure monitor or line. The gas storage means 25 is operable to receive and store gas or gas mixture from the gas laser 1 to facilitate maintenance and/or repairs being carried out on the gas laser 1 or to receive gases separated from a laser gas mixture by the cryogenic gas-processor 2.

Thus the compressor 22 and gas storage means 25 may be operated by the control means 6 to recover the gas or gas mixture from the laser 1 when, for example, it is necessary to open up the laser 1. Alternatively or additionally once the halogen and impurity contents have been removed from the gas or gas mixture from the laser 1 by means of the processor 2 and/or purifier 3 it is possible to achieve separation of remaining rare gases cryogenically in the processor 2. This allows Xenon, Krypton or Argon to be trapped out from a mixture with Helium and/or Neon if liquid Nitrogen is used as a basis for the cryogenic gas-processor 2. Once the Xenon, Krypton or Argon has been isolated, it can be stored elsewhere through cryogenic or mechanical pumping, or even stored in the container 25. Similarly the Helium and/or Neon can be stored either in the apparatus or separate therefrom after compression in the compressor 22. Thus the embodiment of Figure 1 also allows for rare gas separation and storage. The current high price of rare gases makes such recovery economically viable.

Claims

1. Apparatus for controlling the composition of a laser gas or gas mixture, including a cryogenic gas-processor (2) connectible to and substantially in parallel with a gas laser (1) selectively to receive gas or a gas mixture therefrom, remove impurities from the gas or gas mixture and selectively return the purified gas or gas mixture to the gas laser, and a high temperature gas-purifier (3) in gas flow connection with the cryogenic gas-processor (2), substantially in parallel therewith, and connectible to and substantially in parallel with the gas laser (1) selectively to receive gas or a gas mixture therefrom, remove halogen and/or impurities from the gas or gas mixture and selectively return the dehalogenated or purified gas or gas mixture to the gas laser (1), characterised by including gas analysis means (4) connectible to receive gas or gas mixture from the gas laser (1) and operative to analyse the gas or gas mixture and produce output signals indicative of the actual composition of the laser gas or gas mixture, a source (5) of clean laser gas or gas mixture connectible selectively to feed clean gas or selected clean gas mixture components to the gas laser,

control means (6) operative to receive said output signals from the gas analysis means (4) indicative of the actual composition of the laser gas or gas mixture, compare the actual composition values with desired composition values, and operate the cryogenic gas-processor (2) and/or high temperature gas-purifier (3) and/or clean gas or gas mixture source (5) to control the laser gas or gas mixture composition, a gas compressor (22) in a valved gas flow connection with the output side of the cryogenic gas-processor (2) and high temperature gas purifier (3), and gas storage means (25) in valved connection with the output side of the gas-processor (2) and the high temperature gas purifier (3) and in gas flow connection with the gas compressor (2), with the gas compressor (22) and the gas storage means (25) being operable, via the control means (6), to receive and store gas or gas mixture from the gas laser (1) to facilitate maintenance and/or repair being carried out on the gas laser (1), or to receive gasses separated form the laser gas mixture by the cryogenic gas processor (2).

2. Apparatus according to Claim 1, wherein the control means (6) includes a computer.

3. Apparatus according to Claim 1 or Claim 2, connectible to an excimer gas laser.

4. Apparatus according to Claim 3, connectible to an excimer laser containing a gas or gas mixture including one or more rare gases and a halogen containing molecule.

5. Apparatus according to Claim 4, connectible to an excimer gas laser utilising a laser gas containing one or more of Helium, Neon, Xenon, Krypton or Argon gases and a halogen molecule which is one or more of Fluorine or Hydrogen Chloride.

6. Apparatus according to Claim 4 or Claim 5, connectible to an excimer gas laser containing, as impurities, in the gas or gas mixture, one or more of CO_2, Cl_2, CO, CCl_4, CF_4, SiF_4, HF, NO, NO_2, N_2O_4, H_2O, NH_3, N_2, O_2, H_2, CF_2O, OF_2, CH_3Cl, CH_4 and CH_3F.

7. Apparatus according to Claim 6, wherein said cryogenic gas-processor (2) is operable to remove, via liquifaction, one or more of said impurities.

8. Apparatus according to Claim 7, including first and second openable and closable gas flow valves (9,10) respectively on input and output sides of the cryogenic gas-processor (2) operable selectively to control gas flow between the gas laser (1) and the cryogenic gas-processor (2).

9. Apparatus according to any one of Claims 6 to 8, wherein the high temperature gas-purifier (3) includes a high temperature getter operable to remove, via hot metallic means, halogen and/or impurities from the gas or gas mixture.

10. Apparatus according to any one of Claims 1 to 9, wherein the source (5) of clean laser gas or of clean individual components of a laser gas mixture includes individual containers for the or each gas or components, means for selectively communicating said containers with a gas flow line (17) connectible to the gas laser and a fifth openable and closable gas flow valve (18) in said line (17) intermediate the containers and an end of the line connectible to the gas laser (1).

Patentansprüche

1. Vorrichtung zur Steuerung der Zusammensetzung eines Gases oder einer Gasmischung für Laser, mit einer Tieftemperatur-Gasbehandlungseinrichtung (2), die mit einem Gaslaser (1) im wesentlichen parallel hierzu selektiv verbunden werden kann, um Gas oder eine Gasmischung zu erhalten und um Verunreinigungen aus dem Gas oder der Gasmischung abzuziehen und selektiv das gereinigte Gas oder die Gasmischung nach dem Laser zurückzuführen, und mit einem Hochtemperaturgasreiniger (3) in Gasströmungsverbindung mit der Tieftemperatur-Gasbehandlungseinrichtung (2), welche im wesentlichen parallel hierzu verläuft und im wesentlichen parallel mit dem Gaslaser (1) selektiv verbunden werden kann, um ein Gas oder eine Gasmischung von dort abzuziehen und Halogene und/oder Verunreinigungen aus dem Gas oder der Gasmischung abzuziehen und selektiv das enthalogenisierte oder gereinigte Gas oder die Gasmischung nach dem Laser (1) zurückzuführen,
dadurch gekennzeichnet, daß ein Gasanalysator (4) derart einschaltbar ist, daß er ein Gas oder eine Gasmischung aus dem Laser (1) erhält und das Gas oder die Gasmischung analysiert und Ausgangssignale erzeugt, die die tatsächliche Zusammensetzung des Lasergases oder der Gasmischung anzeigen, daß eine Quelle (5) reinen Lasergases oder einer reinen Gasmischung selektiv einschaltbar ist, um reines Gas oder gewählte reine Gasmischungsbestandteile dem Laser zuzuführen, daß eine Steuereinrichtung (6) die Ausgangssignale von dem Gasanalysator (4) empfängt, die die tatsächliche Zusammenset-

zung des Lasergases oder der Gasmischung anzeigen, wobei die Werte der tatsächlichen Zusammensetzung mit den Soll-Zusammensetzungswerten verglichen werden, und daß die Tieftemperatur-Gasbehandlungseinrichtung (2) und/oder der Hochtemperaturgasreiniger (3) und/oder die Quelle reinen Gases oder einer reinen Gasmischung (5) das Lasergas oder die Gasmischungszusammensetzung einstellen, daß ein Gaskompressor (22) über Ventile und Gasströmungsleitungen mit dem Ausgang der Tieftemperatur-Gas-Behandlungseinrichtung (2) und dem Hochtemperaturgasreiniger (3) verbunden ist, daß ein Gasspeicher (25) über Ventile mit dem Ausgang der Gasbehandlungseinrichtung (2) und des Hochtemperaturgasreinigers (3) verbunden ist und in Gasströmungsverbindung mit dem Gaskompressor (22) steht, wobei der Gaskompressor (22) und der Gasspeicher (25) über eine Steuereinrichtung (6) so betätigbar sind, daß entweder ein Gas oder eine Gasmischung vom Gaslaser (1) empfangen und gespeichert wird, um eine Wartung und/oder eine Reparatur am Gaslaser (1) durchführen zu können, oder daß Gase aufgenommen werden, die von der Lasergasmischung durch die Tieftemperatur-Gas-Behandlungseinrichtung (2) abgetrennt wurden.

2. Vorrichtung nach Anspruch 1, bei welcher die Steuereinrichtung (6) einen Computer aufweist.

3. Vorrichtung nach den Ansprüchen 1 oder 2, welche an einen Excimer-Laser anschaltbar ist.

4. Vorrichtung nach Anspruch 3, die an einen Excimer-Laser anschaltbar ist, der ein Gas oder eine Gasmischung mit einem oder mehreren Seltenen Gasen und ein ein Halogen aufweisendes Molekül enthält.

5. Vorrichtung nach Anspruch 4, die an einen Excimer-Gaslaser anschaltbar ist, der eines oder mehrere der folgenden Gase enthält: Helium, Neon, Xenon, Krypton oder Argongase, und das Gas ein Halogenmolekül aufweist, welches Fluor oder Chlorwasserstoff ist.

6. Vorrichtung nach den Ansprüchen 4 oder 5, die an einen Excimer-Gaslaser anschaltbar ist, der als Verunreinigungen im Gas oder der Gasmischung eine oder mehrere der folgenden Komponenten enthält: CO_2, Cl_2, CO, CCl_4, CF_4, SiF_4, HF, NO, NO_2, N_2O_4, H_2O, NH_3, N_2, O_2, H_2, CF_2O, OF_2, CH_3Cl, CH_4 und CH_3F.

7. Vorrichtung nach Anspruch 6, bei welcher die Tieftemperatur-Gas-Behandlungseinrichtung (2) durch Verflüssigung eine oder mehrere der Verunreinigungen entfernt.

8. Vorrichtung nach Anspruch 7, mit ersten und zweiten Gasströmungsventilen (9, 10), die geöffnet und geschlossen werden können und am Eingang und am Ausgang der Tieftemperatur-Gas-Behandlungseinrichtung (2) angeordnet sind, um selektiv die Gasströmung zwischen dem Gaslaser (1) und der Tieftemperatur-Gas-Behandlungseinrichtung (2) zu steuern.

9. Vorrichtung nach einem der Ansprüche 6 bis 8, bei welcher der Hochtemperaturgasreiniger (3) ein Hochtemperaturgetter aufweist, welches über heiße Metallteile Halogene und/oder Verunreinigungen aus dem Gas oder aus der Gasmischung entfernt.

10. Vorrichtung nach einem der Ansprüche 1 bis 9, bei welcher die Quelle (5) eines reinen Lasergases oder mit reinen Einzelkomponenten einer Lasergasmischung einzelne Behälter für jeden Gasbestandteil aufweist, wobei Mittel vorgesehen sind, um selektiv die Behälter mit einer Gasströmungsleitung (17) zu verbinden, die an den Gaslaser anschaltbar ist, wobei ein fünftes Gasströmungsventil (18), welches geöffnet und geschlossen werden kann, in dieser Leitung (17) zwischen den Behältern und der mit dem Gaslaser (1) verbindbaren Leitung liegt.

Revendications

1. Dispositif pour commander la composition d'un gaz ou mélange de gaz pour laser comportant un dispositif de traitement (2) de gaz cryogénique pouvant être relié à un laser à gaz (1) et à peu près en parallèle avec ce dernier, pour recevoir de manière sélective le gaz ou mélange de gaz à partir de celui-ci, supprimer les impuretés du gaz ou mélange de gaz et retourner de manière sélective le gaz ou mélange de gaz purifié vers le laser à gaz, et un purificateur (3) de gaz haute température en liaison avec écoulement de gaz avec le dispositif de traitement (2) de gaz cryogénique, a peu près en parallèle avec celui-ci, et pouvant être connecté au laser à gaz (1) et à peu près en parallèle avec ce dernier pour recevoir de manière sélective le gaz ou mélange de gaz à partir de celui-ci, supprimer l'halogène et/ou les impuretés du gaz ou mélange de gaz et retourner de manière sélective le gaz ou mélange de gaz déhalogéné ou purifié vers le laser à gaz (1), caractérisé en ce qu'il comporte des moyens (4) d'analyse de gaz pouvant être relié pour recevoir le gaz ou mélange de gaz provenant du laser à gaz (1) et opérationnel pour analyser le gaz ou mélange

de gaz et produire des signaux de sortie représentatifs de la composition réelle du gaz ou mélange de gaz pour laser, une source (5) de gaz ou mélange de gaz propre pour laser pouvant être relié de manière sélective pour alimenter du gaz propre, ou les composants du mélange de gaz propre choisi, vers le laser à gaz, des moyens de commande (6) opérationnels pour recevoir lesdits signaux de sortie provenant des moyens (4) d'analyse de gaz représentatifs de la composition réelle du gaz ou mélange de gaz pour laser, comparer les valeurs de la composition réelle avec des valeurs de composition voulues, et actionner le dispositif de traitement (2) de gaz cryogénique et/ou le purificateur (3) de gaz haute température et/ou la source (5) de gaz ou mélange de gaz propre pour commander la composition du gaz ou mélange de gaz pour laser, un compresseur de gaz (22) ayant une liaison pour écoulement de gaz munie d'une vanne avec le côté sortie du dispositif de traitement (2) de gaz cryogénique et du purificateur (3) de gaz haute température, et des moyens (25) de stockage de gaz ayant une liaison munie d'une vanne avec le côté sortie du dispositif de traitement (2) de gaz et du purificateur (3) de gaz haute température et en liaison avec écoulement de gaz avec le compresseur de gaz (22), le compresseur de gaz (22) et les moyens (25) de stockage de gaz pouvant être actionnés, via les moyens de commande (6), pour recevoir et stocker le gaz ou mélange de gaz provenant du laser à gaz (1) pour faciliter l'entretien et/ou la réparation à exécuter sur le laser à gaz (1), ou pour recevoir des gaz séparés du mélange de gaz pour laser par l'intermédiaire du dispositif de traitement (2) de gaz cryogénique.

2. Dispositif selon la revendication 1, dans lequel les moyens de commande (6) comportent un ordinateur.

3. Dispositif selon la revendication 1 ou 2, pouvant être connecté à un laser à excimère.

4. Dispositif selon la revendication 3, pouvant être connecté à un laser à excimère contenant un gaz ou un mélange de gaz comportant un ou plusieurs gaz rares et une molécule contenant un halogène.

5. Dispositif selon la revendication 4, pouvant être relié à un laser à excimère utilisant un gaz pour laser contenant un ou plusieurs parmi l'hélium, le néon, le xénon, le krypton ou l'argon gazeux et une molécule d'halogène qui est une ou plusieurs parmi le fluor ou le chlorure d'hydrogène.

6. Dispositif selon la revendication 4 ou 5, pouvant être relié à un laser à excimère contenant, en tant qu'impuretés, dans le gaz ou le mélange de gaz, un ou plusieurs parmi CO_2, Cl_2, CO, CCl_4, CF_4, SiF_4, HF, NO, NO_2, N_2O_4, H_2O, NH_3, N_2, O_2, H_2, CF_2O, OF_2, CH_3Cl, CH_4, et CH_3F.

7. Dispositif selon la revendication 6, dans lequel ledit dispositif de traitement (2) de gaz cryogénique peut être actionné pour supprimer, via une liquification, une ou plusieurs desdites impuretés.

8. Dispositif selon la revendication 7, comportant une première vanne et une seconde vanne (9, 10) d'écoulement de gaz pouvant être ouverte et fermée, situées respectivement sur les côtés entrée et sortie du dispositif de traitement (2) de gaz cryogénique, pouvant être actionnées de manière sélective pour commander l'écoulement du gaz entre le laser à gaz (1) et le dispositif de traitement (2) de gaz cryogénique.

9. Dispositif selon l'une quelconque des revendications 6 à 8, dans lequel le purificateur (3) de gaz haute température comporte un dégazeur haute température pouvant être actionné pour supprimer, via des moyens métalliques chauds, l'halogène et/ou des impuretés du gaz ou mélange de gaz.

10. Dispositif selon l'une quelconque des revendications 1 à 9, dans lequel la source (5) de gaz propre pour laser ou de composants individuels propres d'un mélange de gaz pour laser comporte des conteneurs individuels pour le gaz ou chaque gaz ou composant, des moyens pour mettre en communication de manière sélective lesdits conteneurs avec une ligne (17) d'écoulement de gaz pouvant être reliée au laser à gaz et une cinquième vanne (18) d'écoulement de gaz pouvant être ouverte et fermée située dans ladite ligne (17) entre les conteneurs et une extrémité de la ligne pouvant être reliée au laser à gaz (1).

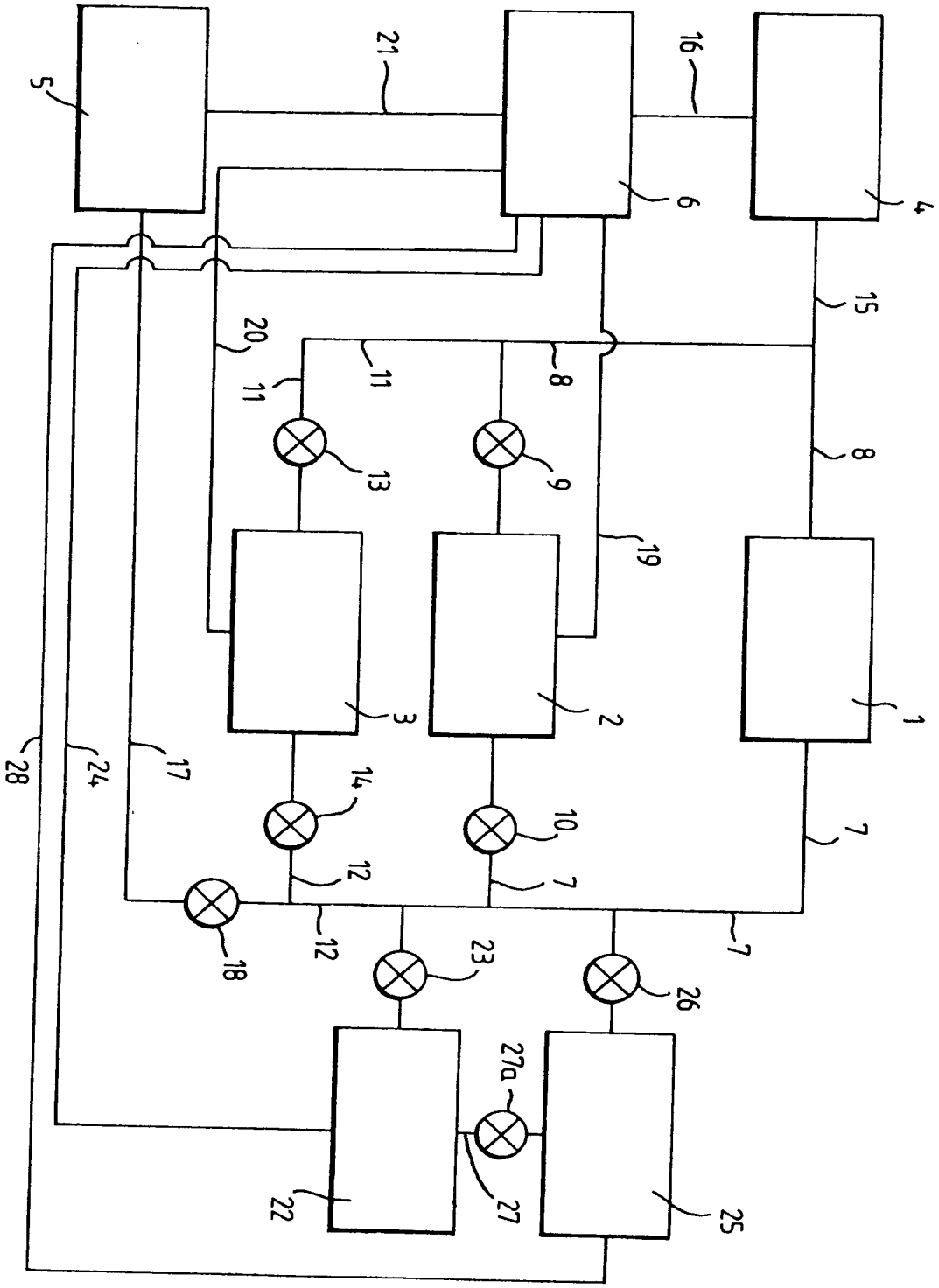
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Fig. 1.